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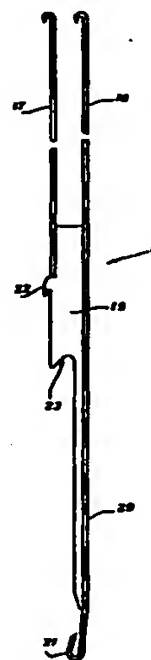
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Two-armed lifting hook with differentiated structure and jacquard weave machine produced therewith.

A two-armed lifting hook (8) for Jacquard weave machines is made with a differentiated structure, having the upper resilient portion formed of two filiform metal arms (17, 18) with top beaks (13) and the lower stiff portion formed of one or more stiff bodies (19) for connecting said arms (17, 18), for instance of a shaped plate connected to said arms and to the extension of one of said arms carrying in its lower part the hook (21) for gripping the return means. In said lifting hook, the tooth (22) for engaging the fixed blade (10) and the shaped seat (23) for bearing onto the fixed bottom blade (9) are preferably obtained in one piece with said bodies, or fixedly connected thereto.

An improved Jacquard weave machine comprises lifting hooks of the type heretofore defined and, furthermore, transversal locking bars (14) for said lifting hooks (8).



EP 0 154 823 A1

"TWO-ARMED LIFTING HOOK WITH DIFFERENTIATED STRUCTURE AND JACQUARD
WEAVE MACHINE PRODUCED THEREWITH"

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The present invention relates to Jacquard weave machines.

5 Several versions of these machines are already known in
technique and, though generally working in a satisfactory way,
they all have the fault not to allow working at the high speeds
now demanded by modern looms. The impossibility for such machines
10 to work at high speeds derives from the fact that the lifting
hooks are highly subject to deformation, on account of their
traditional structure. The present invention therefore proposes to
solve the aforementioned problem by supplying, first of all, a
two-armed lifting hook having a rationally differentiated
15 structure, allowing to guarantee - on one hand - the stiffness
required for an efficient working, with no harmful vibrations and
at higher speeds than those usually adopted for weave machines,
and providing - on the other hand - the resiliency which
characterizes two-armed lifting hooks and which is indispensable
20 for their characteristic way of operating. The invention also
relates to other improvements in the weave machine, which allow to
profit by the advantages deriving from the improved structure of
the lifting hooks.

25 The improved two-armed lifting hook according to the
invention is substantially characterized by having a
differentiated structure, with the upper resilient portion formed
of two filiform metal arms with top beaks and the lower stiff
portion formed of one or more stiff bodies connecting said arms.
Preferably, said lower stiff portion of the lifting hook consists
of a shaped plate, connected to said arms and to the extension of
30 one of said arms carrying in its lower part a hook for gripping
the lifting hook return means.

Preferably, also, in the lifting hook according to the

invention, the tooth for engaging the fixed blade and the shaped seat for bearing onto the fixed bottom blade are obtained in one piece with said plate, which extends in height from the area of said tooth downward.

5 A Jacquard weave machine according to the invention is in turn characterized by the fact that, in addition to being equipped with two-armed lifting hooks of the type heretofore specified, it comprises for each lifting hook a transversal locking bar, positioned below the level of the fixed blade, substantially at
10 the level of the fixed bottom blade, on the side of the lifting hook opposite to that on which said blades are positioned.

The invention will now be described in further detail, with reference to a presently preferred embodiment thereof, illustrated by the accompanying drawings, in which:

15 Fig. 1 is the diagram of a Jacquard weave machine according to the invention, of which the essential members are shown;

Fig. 2 shows, on an enlarged scale, a partially interrupted view of a lifting hook according to the invention; and

20 Figs. 3 and 4 are views similar to that of figure 2, but with the lifting hook in two different operating conditions in respect of some parts of the Jacquard machine, which are also shown.

25 Figure 1 diagrammatically represents, as said, the essential members of a Jacquard weave machine according to the present invention.

30 In known manner, the lifting hooks motion programme, reported on a punched tape 1, is read by the needles 2, which either lift or keep lowered the pushers 3. The pushers 3 being lifted, are pressed by blades 4 and impart an axial movement on the main needles 5, against the action of springs 6. The main needles 5 are provided with teeth 7, which surround the lifting hooks 8 to control the transversal movements thereof.

5 The lifting hooks 8 bear onto fixed bottom blades 9, when
 having to stay at rest, and on fixed blades 10, when having to
 stop in the high end-of-stroke position. Lower moving blades 11
 and upper moving blades 12, provided with reciprocating and
 opposed vertical motion, are apt to cooperate with the upper beaks
 13 of the lifting hooks 8, while - according to the invention -
 transversal bars 14 are apt to stop the lifting hooks 8 and
 stabilize the beaks 13 thereof during the lifting and lowering
 movements. The lifting hooks 8 are held crosswise by guides 15 and
10 16, positioned above and beneath the push needles 5.

 As known, during operation of these machines, when a lifting
 hook has to be moved - for instance lifted - in the presence of a
 perforation on the tape 1, by the moving blade 11 - which
 practically finds itself in its low end-of-stroke position, as
15 indicated in figure 1 - the lifting hook 8 is not shifted by the
 main needle 5, whereby its beak 13 is caught by the blade 11 and
 carried in a high position. Viceversa, in the absence of a
 perforation on the tape 1, a lifting hook 8 which finds itself in
 a high position (namely engaged by the blade 10), after having
20 been caught and lifted by a moving blade 12, is pressed to
 disengage the beak 13 from the blade 10 and is kept pressed up to
 when, in the downstroke, said beak 13 reaches a level below that
 of the blade 10, to subsequently regain the original position and
 move down to bear onto the bottom blade 9, corresponding to the
25 lowest position.

 As known, said lifting and lowering movement of the lifting
 hooks corresponds to the lifting and lowering movement of the
 yarns to produce the weaving shed. As also known, each lifting
 hook can lift one or more stitches, and each stitch is under the
30 action of return means.

 According to the invention, the lifting hooks 8 are made
 with a differentiated structure, having a resilient upper portion

and a stiff lower portion.

Figure 2 represents, in a diagrammatic form and on an enlarged scale, a preferred (but not restrictive) embodiment of the lifting hook according to the invention. As shown, the lifting hook 8 is formed of an upper very resilient portion, consisting of two wire arms 17 and 18 ending with top beaks 13, and of a lower very stiff and compact portion, consisting of a shaped metal plate 19, on the sides of which are welded the two arms 17 and 18 and the lower extension 20 of the arm 18 terminating with the hook 21 for gripping the lifting hook return means. The shaped plate 19 of the lifting hook embodiment shown in figure 2 comprises, in one piece therewith, the tooth 22 for engaging the fixed blade 10 and the shaped seat 23 for bearing onto the fixed bottom blade 9. The plate 19 extends in height, from slightly above the level of the tooth 22 downward.

The lifting hook thus obtained, while being sufficiently elastic in its upper part in order to guarantee a proper working of the Jacquard machine, to the requirements of which it hence adapts itself in a conventional manner, does not undergo in its lower part - thanks to its very stiff and compact structure - any significant deformation, deriving from the movements performed thereby and the stresses imparted thereon (of course, as long as operating with normal loads and overloads).

This particular stiffness allows the lifting hook to work in a precise manner and without vibrations, even at high and very high speeds of the weave machine, guaranteeing a perfect engagement of the beaks 13 by the blades 11 and 12, while a contrasting pulling force acts on the hook 21, due to the return means.

On the other hand, the structure of the lifting hook 8 is such that, when this latter finds itself in the open-shed condition (top dead point), the return force imparted thereon by

the appropriate means forces said lifting hook against the blades 10 and the bottom blades 9, eliminating any possibility of vibration.

5 Moreover, the shape of the lifting hook 8 - in its section between the shaped seat 23, where it bears onto the fixed blade 9, and the hook 21 - allows to guide said lifting hook in its lifting and lowering movement, permitting to considerably reduce the total height of the Jacquard machine, in order to make it more stable and notably increase its working speed.

10 The Jacquard weave machine according to the invention is not only characterized by the presence therein of lifting hooks as those heretofore described, but also by being provided with the already described transversal locking bars 14, the function of said bars - as can be seen at once - being important in order to
15 stabilize even further the behaviour of the lifting hooks in the operation of the Jacquard machine.

Figure 3 shows an anomalous position of the lifting hook 8 according to the invention, while it is moving downward and away - for instance due to anomalous vibrations - from the fixed bottom
20 blade 9. In this position, the advantage provided by the bar 14 for stability purposes is quite evident, said bar preventing the lifting hook from moving even further away from the blade 9, and actually forcing said hook to return in its correct position (which it will finally take up also due to the mutual cooperation
25 between the inclined surfaces 9A and 23A of the fixed bottom blade 9 and of the shaped seat 23).

Whereas, in figure 4, the lifting hook 8 is shown while being forced to stay in a lifted position - due to engagement of the blade 12 with the beak 13 - while, not having been shifted by
30 the needle 5, it has to engage with the fixed blade 10; in this phase, always on account of anomalous vibrations, the lifting hook 8 could move sideways up to disengaging from the blade 10, if this

were not again prevented by the presence of the bar 14 which forces said lifting hook into the correct position, as clearly shown in the drawing.

5 It should be noted that the slack existing between the lifting hook 8 and the bar 14 allows to limit the deformation of the resilient portion of said lifting hook, when it has to disengage from the blade 10, since part of the deformation is eliminated by the actual movement of the lifting hook. Less deformation of the lifting hook means less stress applied between
10 the arms of said hook and the teeth 7 of the needle 5, with consequent less possibility of wear of such teeth. This represents a further important advantage of the machine according to the invention.

15 It is understood that there may be other embodiments of the improved lifting hook according to the invention, differing from that heretofore described and illustrated and falling within the scope of the present invention. In particular, the stiffening of the lower part of the lifting hook may be obtained by connecting the shaped plate to the filiform arms otherwise than by welding,
20 or by producing the tooth 22 and the shaped seat 23 as separate pieces, connected one to the other and to the remaining structure of the lifting hook by stiffening brackets.

CLAIMS

1) Two-armed lifting hook for Jacquard weave machines, characterized by having a differentiated structure, with the upper resilient portion formed of two filiform metal arms with top beaks, and the lower stiff portion formed of one or more stiff bodies connecting said arms.

2) Two-armed lifting hook as in claim 1), wherein said lower stiff portion consists of a shaped plate connected to said arms and to the extension of one of said arms, which carries in its lower part the hook for gripping the lifting hook return means.

3) Two-armed lifting hook as in claim 2), wherein the tooth for engaging the fixed blade and the shaped seat for bearing onto the fixed bottom blade, are obtained in one piece with said plate.

4) Two-armed lifting hook as in claim 1), wherein the tooth for engaging the fixed blade and the shaped seat for bearing onto the fixed bottom blade, are separate and distinct elements being fixedly connected one to the other and to the remaining structure of the lifting hook by means of stiffening brackets.

5) Two-armed lifting hook as in claims 1) to 3), wherein said plate is connected to said arms and to the extension of one of said arms, which carries the hook for gripping the return means, by welding.

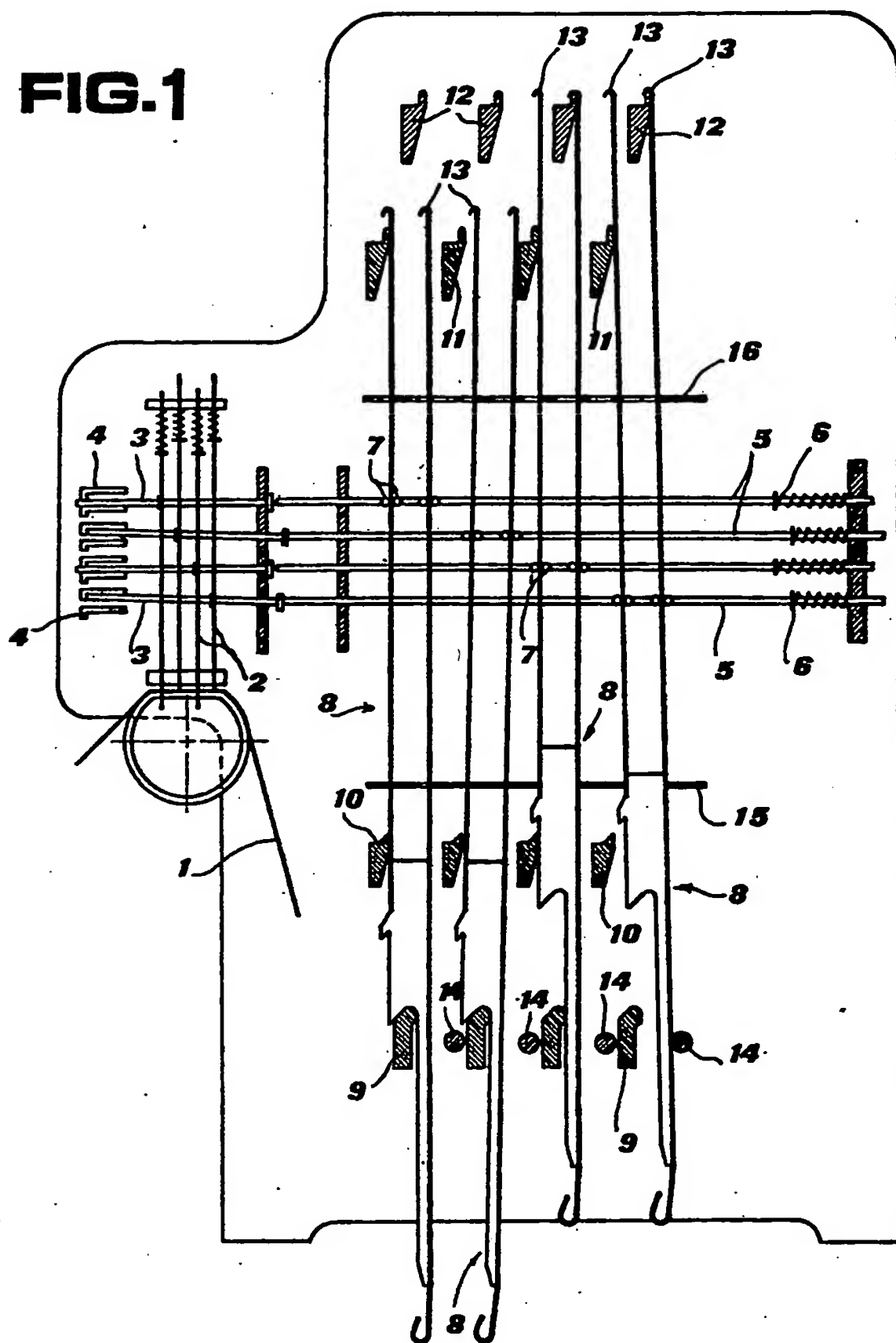
6) Two-armed lifting hook as in claims 1) to 3), wherein said plate extends in height, from the area of the tooth engaging the fixed blade downward.

7) Jacquard weave machine, characterized by the fact that it is equipped with two-armed lifting hooks as in claims 1) to 6).

8) Jacquard weave machine as in claim 7), characterized furthermore by the presence; for each lifting hook, of a transversal locking bar, positioned below the level of the fixed blade, substantially at the level of the fixed bottom blade, on

the side of the lifting hook opposite to that on which said blades are positioned.

FIG. 1

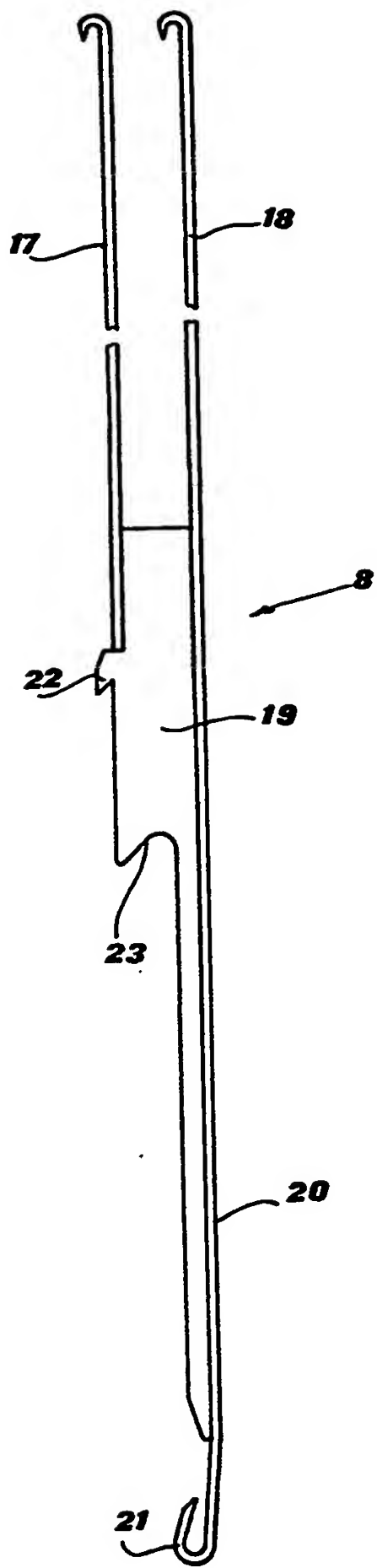


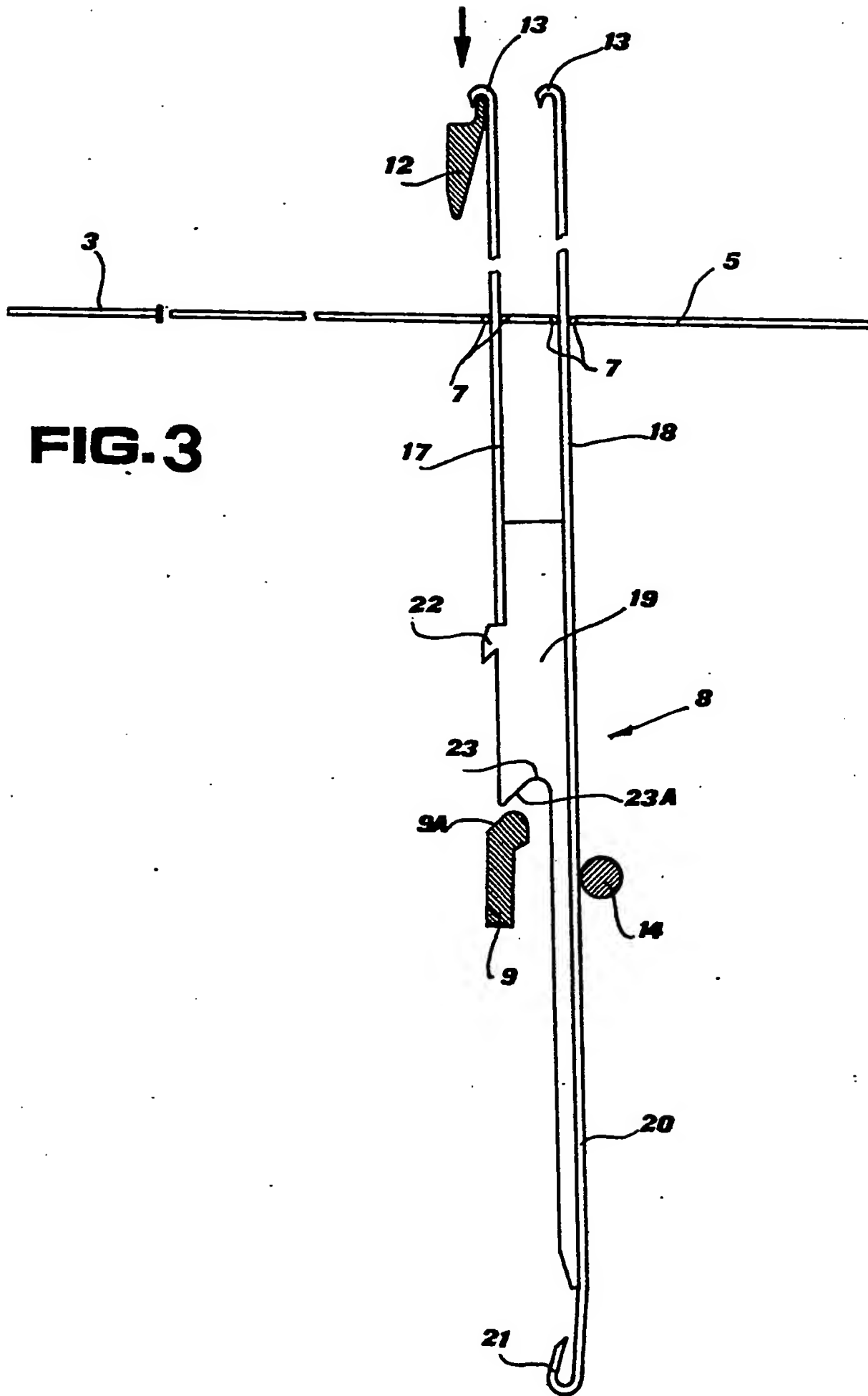
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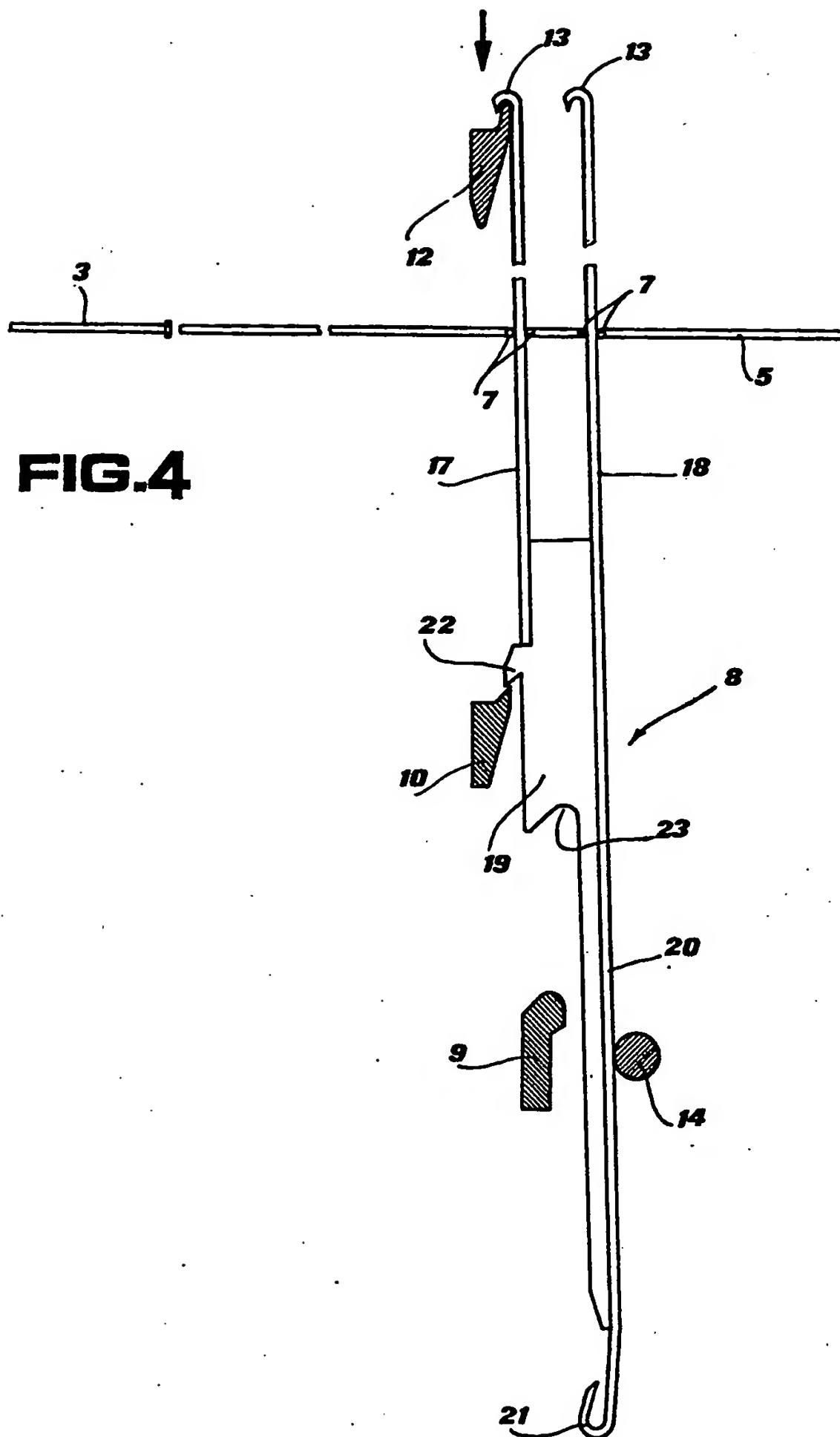
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FIG.2





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EUROPEAN SEARCH REPORT

0154823
Application number

EP 85 10 1546

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
X	FR-A-1 350 392 (WEBSTUHLBAU KARL-MARX-STADT) * Page 1, lines 36-55; figure 1 *	1,7	D 03 C 3/24
A	DE-B-1 292 090 (WEBSTUHLBAU KARL-MARX-STADT) * Claim *	1-3,7	
A	FR-A-2 498 640 (VERDOL)		
			TECHNICAL FIELDS SEARCHED (Int. Cl.4)
			D 03 C
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 31-05-1985	Examiner BOULEGIER C.H.H.
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons Δ : member of the same patent family, corresponding document	